A COMPARATIVE STUDY OF JAPANESE PLANTS OPERATING IN THE U.S. AND AMERICAN PLANTS: RECRUITMENT, JOB TRAINING, WAGE STRUCTURE AND JOB SEPARATION

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I. Introduction

This study compares recruitment, job training, wage structure, and labor mobility of Japanese plants operating in the U.S. (JPUS plants) with local American owned plants. The analyses are based on responses to our questionnaire from 83 JPUS plants (17,678 workers) and 41 American plants (7255 workers).

In this paper, JPUS plants are defined as ones in which at least one Japanese employee has been transferred from the parent company in Japan. Our questionnaire was conducted from May through August 1986 for JPUS plants and from September through December 1986 for American plants. We mailed the same questionnaire to 360 JPUS plants (according to the Japan External Trade Organization (1985), about 370 Japanese manufacturing plants were operating in the U.S. as of 1985). and to 315 comparable American plants. Our first inquiry to the JPUS plants concerned employment. At the same time, we asked for the names of comparable American plants in their local vicinity which produce similar commodities as their plants. The questionnaire was then mailed to these American plants. Due to this

procedure, the survey period of the American plants was four months later than that of the JPUS plants. We received responses from 83 JPUS plants and 41 Amerian plants.

In the Japanese labor market, the job separation rate is remarkably lower and the wage-tenure profile is steeper than in the United States (see section II). This observation has been interpreted mainly through two theories: the view which stresses the cultural and traditional value of company loyalty, and the perspective which places a strong emphasis on the role of job training. However, studies relying only on international comparisons conclude that it is very difficult to distinguish between cultural and economic related factors. By looking at the JPUS plants (which employ American workers), this analysis strives to separate cultural influences from the influences of technology and production systems. This paper statistically examines the following: (1) whether there are differences in modes of recruitment and job training between the JPUS plants and other American plants, and (2) if so, how these differences influence individual wage growth and job separation rate.

Our questionnaire consists of 9 main items (see Appendix): (1) location, (2) industry, (3) date the plant began operation, (4) unionization, (5) number of employees by sex, (6) monthly and annual labor mobility such as separations, quits (worker's voluntary separations), lay-

offs, new hires and recalls by sex, (7) straight-time scheduled working hours and over-time working hours per week by occupation, (8) wage rates by sex and occupation, and (9) total labor costs, fringe benefits, hiring costs and training costs. In addition to the questionnaire, we interviewed personnel department employees for more than a dozen JPUS plants to better understand the characteristics of the technology, production system, mode of job training and recruitment.

Of our particular interest is the effect of job training on wages. In order to study this, information on individual workers regarding wage, education, total work experience in the labor market, and job tenure at the current firm is necessary. Fortunately, we were able to get information on 432 American workers in 5 JPUS plants in a statistical form comparable to nationwide American and Japanese micro data. Using these statistics, we compare the wage structure in JPUS plants with those of local American plants and Japanese plants in Japan.

The structure of this paper is as follows: In section II, we summarize the differences observed in job separation and wage structure in the Japanese and in the U.S. labor markets. Also some theories on recruitment, job training, wages and job separation are briefly reviewed. Section III introduces the mode of recruitment and job training in the JPUS plants and compares them with American

plants by cost and number of employees who received job training in the past 12 months. In section IV, the wage equations of the JPUS plants are estimated on the basis of individual data and are compared with nationwide the U.S. and the Japanese labor market statistics. Section V attempts to statistically test the hypothesis of whether there are significant differences in the quit rate and the lay-off rate between the JPUS plants and American plants. The paper concludes with a provisional summary.

II. Theory of Hiring, Job Training, Wages and Separation

Japan's employment relationships are typically characterized as possessing four "unique" features including: (1) long job tenure/low job separation rate (commonly termed the "lifetime employment system"); (2) the seniority-merit wage system; (3) the large amount of bonus payment (usually representing roughly one-third of total annual earnings); and (4) the enterprise union.

This paper is concerned mainly with the first two. Statistics prove that job tenure is longer in Japan than in the U.S. While the average job tenure of American male workers at their current firms was 7.85 years in 1981, the Japanese tenure was as long as 11.35 years in 1982 (see Higuchi, 1986). Also the monthly separation rate in the manufacturing industry is lower in Japan (1.4 percent in

1981) than in the U.S. (3.6 percent).

The seniority-merit wage system is demonstrated by the observation that job tenure (internal work experience) has a relatively strong effect on wages, compared with work experience prior to joining the current firm (external work experience). According to our previous study (1986), while the difference in effect of total work experience on male wage rate (in terms of percentage growth in wage rate attributable to one year extension of total work experience) was small (0.6 percent in Japan vs. 0.9 percent in the U.S.), the effect of job tenure (wage growth attributable to one year extension of job tenure) was much stronger in Japan (4.1 percent) than in the U.S. (1.2 percent).

Several interpretation have been provided to account for the low job separation rate and steep wage-tenure profile present in the Japanese system. One interpretation stresses the importance of the cultural and sociological factors. Namely, the distinctive Japanese culture and tradition, in which workers are very loyal to their companies, result in the long job tenure or low separation rate. The firms offer paternalistically high wages for the workers with long services to reward them for their loyalty Therefore, wages in the Japanese labor market are tied to an employee's life cycle needs "rather than individual quantity and quality of labor" (Umemura, 1980).

An alternative interpretation emphasizes the role of

job training on wage structure and separation rate (Mincer and Jovanovic, 1981). Some skills acquired in a particular firm are transferable to other firms, but some are not. Transferable skills are called "general human capital" and non-transferable skills are called "specific human capital" (Becker, 1964). While the amount of a worker's general human capital plays an important role in determining his wage in all firms, specific human capital influences only the wage paid in the firm. The risk of a capital loss due to layoff or quit makes it unlikely that workers or employers will bear the full costs of specific capital investments. As Becker argued, a solution is for both parties to share such investments, their mutually guarding against turnover caused by the other party.

The employee's portion of the return on specific capital results in a difference between the wage received in the firm and the opportunity wage elsewhere. In empirical studies, the difference may be indexed by the coefficient of job tenure in the wage equation (Mincer, 1974). Workers with acquired non-transferable skills are deterred from quitting because of this return. Therefore, the duality of the large coefficient of job tenure in wage equation and the low quit rate is expected to be observed in the companies which provide a larger amount of in-house training.

Job training is also expected to have a deterrent effect on the lay-off rate because it costs the firm

directly and indirectly. The indirect cost is the opportunity cost caused by diversion of trainees and trainers from production. At the same time, job training benefits firms by increasing later labor productivity or improving the quality of products. The firms which attempt to give a larger amount of inside job training tend to be more selective in recruiting, choosing workers who are more adept at learning new skills and who are less likely to quit the job. After providing the training, even in the face of a reduction in product demand, it might not be a profitable decision for firms to lay off workers because the firms might give up the future return on job training. Therefore, workers who received a larger amount of inhouse training are less likely to be laid off.

In the process sof rapid economic development, Japanese firms have repeatedly introduced both borrowed and original technology. Introduction of new technology demands not only new equipment but also new skills for workers. When experience with new technologies is limited in the open market, the firms have to develop these new skills in-house (Saxonhouse, 1976, Yasuba, 1976 and Tan, 1980). For these reasons, Japanese firms are supposed to have placed a strong emphasis on in-side job training.

If we accept the assumption, that Japanese firms provide a large amount of inside job training in response to or anticipation of technical change, we can conclude that the

low quit rate and low lay-off rate are consistent with the human capital theory. However, it is very difficult to prove by objective measurement that Japanese firms provide a larger amount of specific human-capital investment than American firms. The different accounting rules and labor laws prevent us from direct comparison of the training cost listed in account books between Japan and the U.S. Since the job training in each country will be influenced quantitatively and as well as qualitatively by the cultural background of workers, intaernational comparative studies are unable to separate the effect of technology and production system on training from the effect of cultural and traditional environments. A study of JPUS plants, employing American workers and operating under the same accounting rules and labor laws as American plants, will provide some insight in examining the effect of technology and production system on job training, recruitment, wage structure and job separation.

III. Job Training and Recruitment in JPUS Plants and American Plants

Table 1 shows descriptive statistics on the number of workers, firm size, industry, the date plants began operation, unionization and location in the responding JPUS plants and American plants. In spite of the fact that we

mailed the questionnaire to JPUS plants and to the comparable American plants in their local vicinity and in the same industry, the distributions of plant size, industry, and location are different to some extent between the responding American plants and the JPUS plants. Compared with the American plants, the JPUS plants have a relatively large share of the plants employing more than 1000 workers (42.8% in the JPUS plants vs. 35.4% in the American plants), of the plants in the transportation equipment industry (22.7% vs. 4.8%) and of those located in Tennessee (30.5% vs. 2.2%). Another characteristic of the JPUS plants is that the unionization is low. While 40.4 percent of the American plants are unionized, only 15.9 percent of the JPUS plants are. We should also note that most of the JPUS plants (86.7%) are new plants which have begun operation after 1970.

Job Training

The Japanese production system is often characterized as relying heavily on human resource effectiveness brought about by mutual trust, mutual help, respect for human dignity, team work, and participation. This system has worked well to raise productivity so far, but at the same time the system is in some ways vulnerable as well as productive. "The system which is so sensitively and critically dependent on human resources, could be jeopardized and lose its efficiency if human resource

effectiveness were to be reduced or disrupted for some reason" (Shimada, 1986). Therefore Japanese firms make special efforts in recruitment and job training.

In interviewing employees in the JPUS plants, we found that many of them apply, with some modification, similar technology and production systems to those in their parent plants in Japan. Many of the large plants which we interviewed brought and installed the same machines made in Japan as their parent plantas are using. They build a stamping section in each assembly process to allow quick and effective feedback from the assembly to stamping. Workers are required to have multiple skills in order to perform a broad variety of tasks. A number of JPUS plants adopt the "just-in-time" production system, which is organized to provide just-in-time flows of goods to reduce inventory costs. They make accurate time tables for production so that the related companies and divisions can provide parts just in time when they are necessary.

In the JPUS plants, not only Japanese but also American managers often stress the importance of job training. Training is provided in several forms: orientation sessions, formal training, and on-the-job training. Orientation is emphasized because understanding the system of the entire organization and the rle of the individual worker reinforce team work and mutual help. The information on conditions of the firm and in the economy is delivered to

workers, including production workers, through informal meeting and employee magazines. Workers are taught not only superficial routine tasks but also basic mechanical knowledge through on-the-job training. This knowledge is necessary to realize job enlargement and to maintain the good condition of machinery without relying on outside experts. Some of the JPUS plants give substantial numbers of employees, including non-supervisory workers, opportunities to visit the parent plants in Japan. During their visits, American workers study the Japanese production system by working together with Japanese workers in the parent plants. The skills acquired by the training are more likely to be specific to the Japanese plants, or non-transferable to other American firms.

Training provided to workers is intensive and long-lasting. Table 2 compares training/education costs and the number of workers who received the training/education in 1985 between the American plants and the JPUS plants. Despite the fact that new hires are fewer in the JPUS plants (the annual new hire rate is 13.87 percent in the JPUS plants and 17.27 percent in the American plants), the proportion of workers who received training/education in the past 12 months is much higher in the JPUS plants (24.35%) than in the American plants (13.48%). In other words, the JPUS plants provide not only training for the new employees but also continuing training or retraining for the existing work

force.

There is also a large difference in the training cost between the JPUS plants and the American plants. While the average training/education cost per worker including workers who didn't receive training/education is 52.9 dollars/year in the American plants, the counterpart in the JPUS plants is two and a half times that amount (134.1 dollars/year). Also, in terms of the training/education cost per trained worker, the JPUS plants spend more (550.7 dollars/year) than the American plants (392.4 dollars per year). The training/education costs listed in the questionnaire was only a small portion of the total training costs because the time diverted from production of trainers and trainees are not included in this figure. However, if the total training costs are assumed to be in proportion with the direct cost listed in the questionnaire, it can be confirmed that the JPUS plants spend significantly more for training/education than the American plants.

Recruitment

The firms which provied a large amount of job training are expected to make strong efforts to select desirable workers in recruitment who are efficient in learning and who are less likely to quit, in order to reduce the risk that the human-capital investment will be in vain. Indeed, although the concrete modes of recruitment are

different among the JPUS plants, depending on the firm size and the location, many of the large firms select new employees through screening in several stages: review of application forms, group discussions, and several personal interviews. This process is for hiring production workers, and not for managers.

Although recruitment costs may appear to be low when checked in a company's accounts, it should be remembered that these costs do not include the compensation for the recruiters' and interviewers' time. However, the comparison outlined in table 2, of recruitment costs between JPUS and American plants, suggests that the JPUS plants spend a larger amount on recruitment than do the American plants. In 1985, ~~new employee costs, including those not hired?~~ American plants spent, on the average, 411 dollars to hire a new employee (the recruitment cost per new employee), the JPUS plants spent as much as 759 dollars. In terms of proportion of recruitment costs to total labor costs, the JPUS plants spent more money on hiring than do the American plants. The difference is statistically significant at the 5 percent level.

IV. Characteristics in the Wage Structure of JPUS Plants

Before examining the wage structure of the JPUS plants, let us compare average wage rates, bonuses, fringe

benefits, total labor costs and working hours of American workers at JPUS plants and at American plants (table 3).

As far as the average straight-time wage rates (before tax and excluding bonus) are concerned, there is no significant difference in wages in the JPUS plants and the American plants except for male clerical workers in JPUS plants, who are earning a higher wage (The hourly wage rate except for workers whose wage is hourly is calculated from the response for the questionnaire as follows: the hourly wage rate of workers who are paid as weekly wage was calculated by dividing the weekly straight-time wage by straight-time scheduled working hours per week, and that of workers who are paid as monthly wage was calculated by dividing the monthly straight-time wage by (straight-time scheduled working hours per week x 30÷7). The average wage rates of production workers in the American plants (8.62 dollars per hour for males and 8.07 for females) are slightly higher than the JPUS plants counterparts (8.20 for males and 7.48 for females). The difference, however, are not significant. In contrast to production workers, the average wage rates of clerical workers are higher in the JPUS plants (12.38 for males and 9.60 for females) than in the American plants (9.97 for males and 8.31 for females). In other words, the JPUS plants have a relatively large difference in wage rates between production workers and clerical workers.

It has generally been believed that a worker who

has been employed for a short time, will have lower wage rate than a worker who has been employed for a long time. Given the newness of the JPUS plants and the consequent higher percentage of young, short-tenured employees (see table 5), it would be expected that the overall rate of pay for a JPUS plant would be lower. In spite of this, the absence of a significant difference in a verage wage rate between JPUS plant and American plant might suggest that higher wages is paid for the workers with the same job tenure in the JPUS plants.

The average bonus payment in the JPUS plants is higher than those in the American plants, regardless of job or sex. Amongst production workers, the high average bonus payment paid by JPUS plants is due to the fact that a relatively larger proportion of JPUS plants actually pay bonuses. Amongst clerical workers JPUS plants pay a large bonus payment per worker. However, compared with the bonus payment in Japan (roughly three or four-months of straight-time wage), that in the JPUS plants (one or two-weeks wage) is clearly low.

Table 3 shows also the average total labor costs per worker. That in the JPUS plants (28740 dollars per year) is significantly higher than that in the American plants

(24105 dollars per year). Approximately a half of this difference between the JPUS plants and the American plants is accounted for by the difference in the fringe benefits (6270 dollars in the JPUS plants vs. 4179 dollars in the American plants) and the remaining half is by the differences of wage payments reflecting bonuses and working hours, training costs, and other labor costs.

The total labor costs per worker and total fringe benefits per worker were calculated by dividing the total labor costs or the total fringe benefits by the number of workers. Since these figures include the payments for Japanese workers in the JPUS plants, if the payments per Japanese worker are assumed to be relatively higher than that per American worker, the total labor costs per worker or the fringe benefits per worker in the JPUS plants which are shown in table 3 might be overestimated in comparison to the counterparts of the American plants. From interviews with the JPUS plants, it was found that the company's average total labor costs and fringe benefits per Japanese worker are, at a maximum, eighty thousand dollars per year and thirty thousand dollars per year, respectively. However, even after subtracting these amounts of costs and recalculating the total labor costs or the fringe benefits per American worker, we can confirm that those in the JPUS plants are still higher than those in the American plants (the total labor costs: 26,624 dollars in the JPUS plants vs. 24,105

dollars in the American plants, the fringe benefits: 5290 dollars vs. 4179 dollars).

Finally, let us take a look at working hours. There is little difference in the straight-time working hours (except for those of part-time workers) between the JPUS plants and the American plants. However, the over-time working hours in the JPUS is longer than that in the American plants by 0.61 hours per week in production workers and by 1.15 hours per week in clerical workers.

Wage Structure in the JPUS Plants

Table 4 shows the industry, location, the first day of operation, the number of workers, and unionization of the five JPUS plants which provided micro data making it possible to estimate wage equations. In addition, table 5 shows the descriptive statistics of male American workers in the JPUS plants, using comparable U.S. data (the Panel Study of Income Dynamnics in the years 1976 to 81) and Japanese data (the 1979 Employment Structure Survey). The PSID and the ESS, which were conducted nationwidely in each country, include employees in the manufacturing industries, as well as in other industries. In order to compare more accurately the results of JPUS plants and that of the American counterparts, we also estimate the wage equation by using only the data of non-union workers in textile, metal, machinery and food industries which the JPUS plants belong

to. Total work experiences in the labor market, which are not included in these surveys, are calculated as the employee's age minus number of years of schooling minus 6 (the elementary school entrance age). For male workers, this approximation is not expected to result in a significant error since their work interruption period is short. Since this approximation cannot be applied to female workers as their work interruption is not as easy to estimate, our study is limited to male workers.

The descriptive statistics suggest that the proportion of young workers is high in the JPUS plants. This is due to the fact that these JPUS plants are relatively new. While the proportion of workers under 30 years old is 37.4 percent in the American textile, metal, machinery and food industries, it is 53.0 percent in the JPUS plants. When considering the age distribution of employees in JPUS plants and American plants, the average job tenure in all age groups is shorter in the JPUS plants than in the American counterparts (5.25 years vs. 8.31 years). However, limiting our study to workers under 30, we find that the job tenure is longer in the JPUS plants (3.28 years vs. 2.95 years). This jight imply that the separation rate in the JPUS plants is low (see section V).

The estimated wage equation is assumed to be a semi-logarithmic form so that estimated parameters are not influenced by the difference in measurement unit of wage rate

cause by the difference of countries and sample periods.

$$(1)\quad \log W = a+bE+cE^2+dX+eX^2+fT+gT^2$$

where W = the hourly wage rate, E = the school years, X = the total work experience in the labor market, and T = the job tenure at the current firm. SInce PSID data is pooled data from 1976 to 81, the year dummy variables are added.

Table 6 presents the estimated parameters of the wage equations for: JPUS plants with bonus and JPUS without bonus, the U.S. firms of all industries, the U.S. non-union workers in textile, metal, machinery and food industries (the sector that the JPUS plants participating in this portion of the study belong to) and Japanese firms of all industries. According to the human capital theory, the rate of return to schooling can be calculated as the % increase in wage rate attributable to an additional year of schooling, the product of the amount of general human capital (transferable skills to other firms) and its rate of return calculated as the growth rate in wage rate attributable to work experience in total labor market, and the product of the amount of specific human capital (non-transferable skills to other firms) and its rate of return calculated as the growth rate in wage rate attributable to tenure since entering the current firm (Mincer, 1974). In other words, these returns to schooling, general human capital and specific human capital are supposed to be written as follows:

$$(2)\quad \frac{\partial \log W}{\partial E} = b+2cE$$

$$(3)\quad \frac{\partial \log W}{\partial X} = d+2eX$$

$$(4)\quad \frac{\partial \log W}{\partial T} = f+2gT.$$

Table 7 shows these returns in the JPUS plants, American firms and Japanese firms which are evaluated at common values, or means of schooling, work experience and job tenure of American firms and Japanese firms.

The steep wage-tenure profile has been pointed out, as a feature of the wage structure in the Japanese labor market. Our estimated results prove that the wage growth attributable to job tenure in Japan (4.75 percent in all age groups) is obviously higher than that in the U.S. (1.54 percent). On the other hand, the wage growth attributable two job tenure of American workers in the JPUS plants (3.33 percent in the wage rate including bonuses and 3.23 percent excluding them) is between those in Japan and the U.S. Namely, the wage growth attributable to the job tenure in the JPUS plants is more than twice as much as the counterpart of other American firms, but does not reach that in Japan. Even if the sample is limited to non-union workers in textile, metal, machinery and food industries, it is confirmed that the American workers in the JPUS plants have a steeper wage-tenure profile than the counterparts in average American firms. This relationship can be observed in the young age group and the old age group. According to the

human capital theory (Mincer, 1974), the slope of wage profile with respect to job tenure is interpreted as the product of two factors: the efficiency of the specific job training and its amount. Consequently, we conclude that either and/or both of them are larger in the JPUS plants than in the American firms, from examining the wage ~~tenure~~ structure.

Compared with the effect of tenure on wages, that of work experience is not so large in the JPUS plants. While that in the JPUS plants is slightly higher than that in the American firms in the houng age group, the effect on the older age group is so low in the JPVS plants that the effect on all age groups is observed to be lower there than in the American firms. From the above observations, we can conclude that the JPUS plants do give less importance to the skills which workers acquired in the other firms, in particular concerning workers in the older age group.

Another interesting thing is the effect of schooling on wages. We find that the effect in the Japanese labor market (16.79 percent) is much higher than that is the U.S. (6.62 percent). A high effect of schooling on wages is also observed in the JPUS plants. This is consistent with the relatively large wage difference between the production workers and the clerical workers in the JPUS plants observed in table 3, if the clerical workers are assumed to be more educated than the production workers. In particular, in the older age group, the effect of schooling on wages is great.

V. Labor Mobility in the JPUS Plants and the American Plants

How does the larger amount of specific skills in the JPUS plants influence such form of job separations as quitting and lay-off? The specific skills create a difference between the wage paid in the current firm and alternative wage paid for the same person and the same skill in other firms since it is non-transferable and does not increase the worker's productivity in other firms. Therefore, the quit rate of workers who acquire larger amounts of specific skills is expected to be lower. The separation of workers with specific skills also leads to a loss for the employer because the productivity of these workers is greater than their rate of pay after the training. Consequently, tahe lay-off rate of these workers is also expected to be low. Is the quit rate or the lay-off rate in the JPUS plants lower than in American plants?

Table 8 presents the total separation rates, quit rates, lay-off rates, retirement rates, terminal rates, total accession rates, new hire rates and recall rates of American workers in the JPUS plants (17135 workers in 79 plants) and in the American plants (7196 workers in 40 plants) which responded to our questionnaire. In addition to table 8, table 9 shows these rates by firm size.

The annual separation rate is clearly lower in the JPUS plants than in American plants, regardless of plant

size (19.52 percent vs. 28.17 percent). On the other hand, the monthly separation rate also shows a lower level in the JPUS plants (1.66 percent) than in the American plants (3.53 percent), however, it is not possible to compare these exactly because of seasonal movements. While the JPUS plants were given the questionnaire between May and August, the American plants were given the questionnaire from September to December. According to the Employment and Earnings, the average monthly rates in manufacturing in the U.S. from 1971 to 1981 (the recent statistics are not available) are 4.38 percent between May and August and 4.15 percent between September and December. If the observed rates in the JPUS plants and the American plants are adjusted seasonally based on this information, the difference in the separation rates between them must be larger than the difference observed in table 8. Therefore, we can conclude that the separation rate in the JPUS plants is significantly lower than in the American plants in the annual base as well as in the monthly base. For reference, comparing the monthly separation rate with the counterpart in the Japanese labor market ini the 1983 Monthly Labor Survey, we find that the separation rate in the JPUS plants is higher than that in the Japanese labor market (the monthly separation rate in manufacturing excluding the workers who are transferred to another plant within the firm is 0.9 percent, and the separation rate including them is 1.3 percent).

The separation rate can be divided into quit rate, lay-off rate, retirement rate and termination rate. Among them, the quit rate has the largest difference between the JPUS plants and the American plants. While the annual quit rate is 17.86 percent in the American plants, the rate in the JPUS plants is as low as 9.29 percent. The difference is greatest in the large plants (1.91 percent in the JPUS plants vs. 13.04 percent in the American plants). It can also be proved using statistics by sex that the JPUS plants have lower quit rates than the American plants regardless of sex (8.64 percent vs. 17.05 percent for male workers, 12.47 percent vs. 20.53 percent for female workers). Furthermore, even if the seasonal movement of the monthly quit rate in our questionnaire (0.79 percent in the JPUS plants and 2.33 percent in the American plants) are adjusted based on the Employment and Earnings (2.25 percent between May and August and 1.85 percent between September and December), the monthly quit rate in the JPUS plants is still lower than in the American plants. From above observations, we conclude that the JPUS plants clearly has a lower quit rate.

Generally speaking, the quit rate of workers with short tenure is relatively high (Mincer and Jovanovic, 1981). Since the proportion or these workers is higher in the JPUS plants than in American plants, the quit rate of the JPUS plants is expected to be high, other things equal. In spite of that, the low quit rate observed there suggest that the

job training and recruitment process in the JPUS plants have significant negative effect on workers' quit behavior.

As contrasted with the quit rates, as far as the total lay-off rates are concerned, the low lay-off rate in the JPUS plants does not seem to be prevailing. The annual lay-off rate shows the statistically significant difference (7.35 percent in the JPUS plants vs. 8.56 percent in the American plants), but the difference in the monthly lay-off rate is not significant at the 10 percent level (0.70 percent vs. 0.88 percent). However, a close look at each of these rates by plant suggests the low lay-off rate in the JPUS plants. For example, the proportion of plants which laid off workers in the past 12 months in relation to the total plants is clearly lower in the JPUS plants (16.1 percent) than in the American plants (55.0 percent). The reason why the difference in total lay-off rates is apparently small is that one of the large electric machinery plants laid off more than 40 percent of its workers, in response to the rapid decrease in product demand. The large scale lay-off in this plant raises the entire lay-off rate in the JPUS plants. With the exception of this plant, the JPUS plants are less likely to lay off the workers than the American plants (the annual lay-off rate in the JPUS plants except for this plant was 4.65%).

Among the other separation rates, a more impressive one is termination rate. The retirement rate is low in the

JPUS plants, reflecting the small proportion of old workers. On the other hand, the termination rate, or the rate of the workers who separated from the firms due to their expired contract, is higher in the JPUS plants than in the American plants. In other words, the termination rate shows the opposite relationship than other separation rates. The high termination rate in the large JPUS plants (5.05 percent in annual base) is outstanding, in contrast with their low quit rate. These plants might distinguish the workers who want to quit the job in some given period from other workers in the recruitment process and assign them the jobs with a contract period limit.

Next, let us take a look at the accession rate. The annual total accession rate in the JPUS plants is relatively low (17.10 percent vs. 24.40 percent). If the labor demand is given, the plants in which quitters are few don't have to hire many new workers. The small JPUS plants have a higher new hire rate (33.52 percent in annual rate), due to the fact that most of them opened recently, than the small American plants (19.24 percent). The new hire rate, however, in the medium or large JPUS plants (17.77 percent or 4.73 percent, respectively) clearly lower than in their American counterparts (25.01 percent or 7.07 percent). The similar relationships are also observed in the monthly accession rates and new hire rates.

VI. Concluding Remarks

We have presented empirical evidence from the comparative study in JPUS plants and American plants supporting a theoretical framework that the human capital formation and recruitment process, related with the technology and production system, plays an important role in determining individual wage growth in the employing firm and job separation probabilities. Evidence from our questionnaire supported the following conclusions: (1) JPUS plants have high training costs to insure that the workers acquire the necessary skills in order that the JPUS plants' idiosyncratic production system runs smoothly. (2) They make strong efforts to recruit workers to match their production system and therefore have high recruitment costs. (3) The JPUS plants have a wage structure that gives more importance to internal work experience (job tenure) than to external work experience. (4) The separation rate, especially the quit rate, in the JPUS plants is clearly low. It is important to note that the JPUS plants, in spite of employing American workers, have qualitatively similar characteristics to what has been observed in firms in Japan.

However, one of the drawbacks of this analysis is related to statistical problems. Despite our attempt that the questionnaire was mailed to JPUS plants and American plants in the same industry and in the same location, the composition of respondents are not necessarily the same in both groups and possibly resulting in biases in the

responses. We tried to conduct the questionnaire for the plants in the same industries to eliminate the influence of condition in product demand on lay off rate. Since the sample size is limited, we were not able to analyze the costs, wages and labor mobility by industry. We could not eliminate the influence of possible changes in product demand on lay-off policy. To do so would require observing firms in the same industries undergoing decline in demand. There is no doubt that we must take account of the change in product demand if we are to compare the propensities of laying off the workers in JPUS plants and in American plants accurately. Furthermore, since most of the JPUS plants began to operate after 1970, our results might be influenced not only by the difference in technology and production system but also by tahe difference of how long the plant has been in operation. These questions should be investigated in future research.

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Table 1

Descriptive Statistics of American Plants and JPUS Plants

	JPUS Plants		American Plants	
	No. of Firms	No. of Current Workers	No. of Firms	No. of Current Workers
Mailing	360		318	
Respondents	83 (23.0%)	17,678	41 (23.0%)	7,255
Average Number of American workers	-	215.6	-	177.0
Male	-	128.9	-	110.4
Female	-	86.7	-	66.6
Average Number of Japanese workers	-	8.9	-	-
Firm Size				
Less than 100 workers	46 (58.2%)	1,826 (10.7%)	21 (52.5%)	1,191 (16.4%)
100-999 workers	29 (36.7%)	7,978 (46.6%)	17 (42.5%)	3,499 (48.2%)
More than 1000 workers	4 (5.1%)	7,331 (42.8%)	2 (5.0%)	2,565 (35.4%)
Industry				
Foods	6 (7.6%)	167 (1.0%)	3 (7.5%)	272 (3.8%)
Textiles	5 (6.3%)	1,190 (6.9%)	1 (2.5%)	120 (1.7%)
Lumber	1 (1.3%)	12 (0.1%)	1 (2.5%)	31 (0.4%)
Paper - Printing	1 (1.3%)	10 (0.1%)	0 (0%)	0 (0%)
Chemicals	8 (10.1%)	1,732 (10.1%)	7 (17.5%)	1,025 (14.2%)
Ceramic Stone Clay	3 (3.8%)	92 (0.5%)	10 (25.0%)	636 (8.8%)
Metal	11 (13.9%)	1,679 (9.8%)	2 (5.0%)	461 (6.4%)
Machinery	2 (2.5%)	126 (0.7%)	1 (2.5%)	165 (2.3%)
Elec. Mach.	18 (22.8%)	6,246 (36.5%)	10 (25.0%)	3,497 (48.6%
Trsp. Eqpt.	6 (7.6%)	3,889 (22.7%)	2 (5.0%)	346 (4.8%)
Prec. Inst.	3 (3.8%)	204 (1.2%)	0 (0%)	0 (0%)
Mfg. Misc.	15 (19.0%)	1,788 (10.4%)	3 (7.5%)	643 (8.9%)

Table 1 (continued)

	← JPUS Plants		← American Plants	
	No. of Firms	No. of Current Workers	No. of Firms	No. of Current Workers
The first date the plant operated				
-1959	2 (2.4%)		17 (41.5%)	
1960 - 69	9 (10.8%)		10 (24.4%)	
70 - 74	11 (13.3%)		8 (19.5%)	
75 - 79	23 (27.7%)		4 (9.8%)	
80 - 83	30 (36.1%)		1 (2.4%)	
84 - 85	8 (9.6%)		1 (2.4%)	
Union				
Unionized	13 (15.9%)		16 (40.0%)	
Non-unionized	69 (84.1%)		24 (60.0%)	
Location				
California	14 (17.1%)		5 (12.2%)	
New Jersey	10 (12.2%)		3 (7.3%)	
Tennessee	8 (9.8%)		1 (2.4%)	
Georgia	8 (9.8%)		3 (7.3%)	
Texas	5 (6.1%)		2 (4.9%)	
North Carolina	5 (6.1%)		3 (7.3%)	
South Carolina	4 (4.9%)		2 (4.9%)	
Illinois	4 (4.9%)		2 (4.9%)	
New York	4 (4.9%)		2 (4.9%)	
Ohio	3 (3.7%)		5 (12.2%)	
Michigan	2 (2.4%)		1 (2.4%)	
Washington	2 (2.4%)		2 (4.9%)	

Table 1 (continued)

	← JPUS Plants		← American Plants	
	No. of Firms	No. of Current Workers	No. of Firms	No. of Current Workers
Florida	2 (2.4%)		1 (2.4%)	
Arkansas	2 (2.4%)		0 (0%)	
Pennsylvania	1 (1.2%)		3 (7.3%)	
Maryland	1 (1.2%)		0 (0%)	
Massachusetts	1 (1.2%)		0 (0%)	
Minnesota	1 (1.2%)		0 (0%)	
Montana	1 (1.2%)		1 (2.4%)	
Nebraska	1 (1.2%)		0 (0%)	
Wisconsin	1 (1.2%)		2 (4.9%)	
Iowa	1 (1.2%)		0 (0%)	
Puerto Rico	1 (1.2%)		0 (0%)	
Indiana	0 (0%)		1 (2.4%)	
Colorado	0 (0%)		1 (2.4%)	
Kentucky	0 (0%)		1 (2.4%)	

Table 2

Training Cost and Recruitment Costs in JPUS plants and American plants

	JPUS plants		American Plants		
	(a) Number of Respondents	(b) Average ((c) Standard Deviation)	(d) Number of Respondents	(e) Average ((f) Standard Deviation)	(g) Test Statistics
I. Proportion of Workers who received Training/ Education last year. (%)	46	24.35 (26.56)	19	13.48 (14.57)	2.11**
II. Training/Education per Worker (dollars/year)	53	134.1 (198.5)	27	52.9 (53.8)	3.05**
III. Total Labor Cost per Worker (dollars/year)	64	28740 (8301)	33	24105 (5266)	3.35**
IV. Proportion of Training/Education Cost in Total Labor Cost (%)	52	0.52 (0.55)	26	0.28 (0.39)	2.22**
V. Recruitment Cost per New Employee (dollars/year)	57	759 (909)	22	411 (647)	1.90*
VI. Proportion of Recruitment Cost in Total Labor Cost (%)	57	0.64 (0.93)	22	0.28 (0.59)	2.37**

Note: The test statistics (g) are the statistics to test the hypothesis that the means of each variable are equal in the JPUS plants and the American plants and calculated as follows:

$$g = (b - e) / \sqrt{(c^2/a + f^2/d)}$$

** : Significant at the 5 percent level.
* : Significant at the 10 percent level.

Table 3

Average Wage Rate, Bonus, Fringe Benefits and Working Hours of American Workers in the JPUS plants and the American plants

	JPUS Plants			American Plants			
	(a) Number of Responses	(b) Average ((c) Standard Deviation)	(d)	(e) Number of Respondents	(e) Average ((f) Standard Deviation)	(g)	Test Statistics
I. Hourly Wage Rates							
a. Average Straight-time Wage Rates (in dollars)							
Production Workers							
Male	57	8.20	(2.78)	34	8.62	(1.86)	-0.86
Female	45	7.48	(2.20)	26	8.07	(1.88)	-1.20
Clerical Workers							
Male	42	12.38	(5.52)	21	9.97	(3.84)	2.02**
Female	57	9.60	(6.18)	33	8.31	(1.78)	1.47
Part-time Workers	29	6.14	(2.62)	19	6.51	(2.09)	-0.54
II. Bonuses							
a. Average Bonus Payments (including the Workers who did not receive bonuses)							
Production Workers							
Male	50	333.9	(397.6)	32	277.9	(470.5)	0.56
Female	43	283.9	(356.3)	27	164.0	(292.0)	2.10**
Clerical Workers							
Male	47	892.9	(1033.1)	22	358.0	(451.0)	2.99*
Female	49	495.6	(611.6)	29	443.5	(498.7)	0.41
b. Proportion of the plants which paid bonuses in the total responding plants (%)							
Production Workers							
Male	50	60.0		32	40.6		1.75*
Female	43	53.5		27	29.6		2.06**
Clerical Workers							
Male	47	61.7		22	45.5		0.79
Female	49	68.1		29	58.6		0.84

Table 3 (continued)

	JPUS Plants		American Plants		
	(a) Number of Responses	(b) Average ((c) Standard Deviation)	(d) Number of Respondents	(e) Average ((f) Standard Deviation)	(g) Test Statistics
c. Average Bonus Payments to Workers who received one (in dollar/year)					
Production Workers					
Male	30	556.5 (372.8)	13	684.1 (520.4)	-0.80
Female	23	530.8 (324.7)	8	553.6 (265.0)	-0.20
Clerical Workers					
Male	29	1447.1 (941.3)	10	787.5 (314.3)	3.28**
Female	32	758.8 (610.7)	17	756.5 (428.4)	0.02
III. Total Labor Costs					
a. Average Total Labor per Worker (in dollar per year)	64	28740 (8301)	33	24105 (5266)	3.35**
IV. Fringe Benefits					
a. Average Fringe Benefits per Worker (in dollar per year)	63	6270 (6490)	34	4179 (1522)	2.44**
b. Proportion of	62	21.81 (7.20)	32	17.46 (5.57)	3.24**
V. Working Hours					
a. Straight-time Working Hours per Week					
Production Workers	70	39.85 (1.65)	38	39.85 (0.81)	0.00
Clerical Workers	75	39.57 (2.01)	39	39.24 (1.61)	0.95
Part-time Workers	28	35.86 (12.52)	21	24.81 (8.39)	3.69**
b. Over-time Working Hours per Week					
Production Workers	65	2.66 (2.67)	35	2.05 (2.23)	1.22
Clerical Workers	66	1.73 (2.45)	32	0.58 (1.13)	3.18**

Table 4

Industry, Location, the First Date They Operated, the Number of Workers, and Unionization of the JPUS plants which provided Micro Data to Estimate Wage Equations

	A	B	C	D	E
Industry	Textile Prod.	Fabricated Metal Prod.	Electric Machinery	Precision Machinery	Food
State	GA	NJ	NJ	CA	NJ
First Date of Operation	1974.4	1963.4	1964.12	1980.1	1983.5
No. of American Workers					
Total	579	190	92	31	17
Male	270	156	42	19	7
Female	309	34	50	12	10
No. of Japanese Workers	48	22	12	5	1
Unionization	None	None	None	None	None

Table 5

Means and Standard Deviation of Schooling, Total Work Experience and Job Tenure at the Current Firms of Male Workers in the JPUS plants, the American Firms and Japanese Firms

	JPUS (American Workers)	U.S. (all industries)	U.S. (Non-union workers in Textile, Metal Machinery and Food)	Japan (all industries)
All Age				
School years	12.41	12.73	12.84	11.94
	(1.32)	(2.70)	(2.51)	(2.49)
Experience	14.38	16.30	17.51	18.53
	(9.87)	(10.93)	(10.96)	(10.63)
Tenure	5.25	7.85	8.31	11.35
	(4.38)	(8.31)	(9.02)	(8.94)
Sample Size	432	8103	797	21140
Under 30 Years Old				
School Years	12.20	12.83	12.87	12.48
	(0.94)	(2.10)	(2.19)	(2.32)
Experience	7.12	6.24	6.86	6.93
	(3.10)	(2.66)	(2.90)	(3.99)
Tenure	3.28	2.82	2.95	4.72
	(2.62)	(2.52)	(2.78)	(3.61)
Sample Size	229	2963	298	6881
Over 30 Years Old				
School years	12.61	12.67	12.82	11.67
	(1.59)	(3.00)	(2.68)	(2.52)
Experience	21.58	22.10	23.87	24.12
	(8.96)	(9.60)	(8.87)	(7.98)
Tenure	7.20	10.75	11.52	14.35
	(4.87)	(9.07)	(9.90)	(8.99)
Sample Size	203	5140	499	14259

Table 6

Regression Results of Male Wage Equations in the JPUS Plants, the U.S. and Japan

	JPUS (with Bonus)	All Age JPUS (without Bonus)	U.S. (all industries)	U.S. (non-union workers in Textile, Metal Machinery and Food	Japan (all industries)
Constant	-1.7366	-1.7813	0.5752	1.6455	4.414
	(-1.51)	(-1-64)	(9.77)	(6.75)	(16.02)
E	0.3816	0.3858	0.0144	-0.0999	0.4491
	(2.35)	(2.51)	(1.59)	(-2.70)	(10.15)
E^2	-0.0078	-0.0080	0.0021	0.0076	-0.0114
	(-1.40)	(-1.52)	(5.72)	(5.26)	(-6.51)
X	0.0206	0.0206	0.0237	0.0180	0.0390
	(4.70)	(4.96)	(14.33)	(3.62)	(8.87)
X^2	-0.0004	-0.0004	-0.0004	-0.0003	-0.0007
	(-4.48)	(-4.51)	(-10.96)	(-2.37)	(-6.85)
T	0.0650	0.0614	0.0231	0.0267	0.0629
	(9.44)	(9.44)	(14.16)	(5.88)	(14.80)
T^2	-0.0017	-0.0015	-0.0004	-0.00047	-0.0008
	(-5.38)	(-5.23)	(-7.24)	(-3.23)	(-5.89)
R^2	0.592	0.612	0.305	0.477	0.129

Note: Figures in parenthesis are t-values.

Table 6 (continued)

Regression Results of Male Wage Equations in the JPUS Plants, the U.S. and Japan

Under 30 years old

	JPUS (with Bonus)	JPUS (without Bonus)	U.S. (all industries)	U.S. (non-union workers in Textile, Metal, Machinery and Food	Japan (all industries
Constant	1.0445 (0.78)	1.1343 (0.91)	0.5048 (2.85)	2.3931 (4.92)	4,4086 (8.34)
E	0.0039 (0.02)	-0.0108 (-0.06)	0.0099 (0.37)	-0.1865 (-2.51)	0.4456 (5.37)
E^2	0.0037 (0.58)	0.0042 (0.71)	0.0020 (1.97)	0.0107 (3.79)	-0.0117 (-3.67)
X	0.0397 (1.97)	0.0379 (2.01)	0.0442 (4.11)	-0.0399 (-1.47)	0.0587 (3.31)
X^2	-0.0013 (-0.94)	-0.0012 (-0.95)	-0.0020 (-2.44)	0.0034 (1.75)	-0.0016 (-1.28)
T	0.0911 (5.66)	0.0886 (5.90)	0.0769 (9.62)	0.0833 (4.27)	0.0982 (5.84)
T^2	-0.0051 (-2.85)	-0.0051 (-3.05)	-0.0053 (-5.69)	-0.0054 (-2.67)	-0.0046 (-3.45)
R^2	0.563	0.579	0.223	0.444	0.064

Table 6 (continued)

Regression Results of Male Equations in the JPUS Plants, the U.S. and Japan

Over 30 years old

	JPUS (with Bonus)	JPUS (without Bonus)	U.S. (all industries)	U.S. (non-union workers in Textile, Metal, Machinery and Food	Japan (all industries)
Constant	-2.6549 (-1.45)	-2.8756 (-1.66)	0.6538 (9.72)	1.3514 (4.30)	4.4255 (12.96)
E	0.5348 (2.07)	0.5582 (2.28)	0.0138 (1.37)	-0.0657 (-1.46)	0.4295 (7.91
E^2	-0.0128 (-1.43)	-0.0136 (-1.61)	0.0021 (5.07)	0.0063 (3.55)	-0.0103 (-4.74)
X	0.0044 (0.34)	0.0074 (0.61)	0.0180 (6.14)	0.0252 (2.41)	0.0404 (3.94)
X^2	-0.0001 (-0.59)	-0.0002 (-0.78)	-0.0003 (-5.27)	-0.0004 (-1.99)	-0.0007 (-3.48)
T	0.0590 (5.35)	0.0559 (5.35)	0.0184 (9.98)	0.0213 (3.97)	0.0658 (13.54)
T^2	-0.0014 (-3.02)	-0.0013 (-2.94)	-0.0003 (-4.19)	-0.0003 (-1.94)	-0.0009 (-5.80)
R^2	0.510	0.527	0.260	0.430	0.131

Table 7

Percent Growth in Wage Rate Attributable to Schooling, Work Experience and Job Tenure in the JPUS Plants, American Firms and Japanese Firms (%)

	JPUS (with Bonus)	JPUS (without Bonus	U.S. (all industries)	U.S. (non-union workers in Textile, Metal, Machinery and Food)	Japan (all industries)
			All Age		
Schooling	18.92	18.78	6.62	8.76	16.79 (12.335 years)
Experience	0.57	0.64	0.98	0.82	1.46 (17.415 years)
Tenure	3.33	3.23	1.54	1.49	4.75 (9.600 years)
			Under 30 years old		
Schooling	9.74	9.06	6.05	8.53	14.39 (12.655 years)
Experience	2.23	2.16	1.79	0.49	3.76 (6.585 years)
Tenure	5.25	5.00	3.69	4.02	6.36 (3.770 years)
			Over 30 years old		
Schooling	22.41	22.60	6.55	8.76	17.16 (12.170 years)
Experience	-0.19	-0.04	0.53	0.57	0.66 (23.110 years)
Tenure	2.47	2.43	1.31	1.30	4.28 (12.550 years)

Note: The percentage growth in wage rate attributable to schooling is calculated by the equation $\partial \log W / \partial E = b + 2C\bar{E}$. $\bar{E}$ is the simple average of means years of schooling in the U.S. and Japan, which are shown in parenthesis (the common value is given to the above five categories). The percentage growth in wage rate attributable to experience and tenure is similarly calculated.

Table 8

Separation Rates, Quit Rates, Lay-off Rates, and Accession Rates of American Workers in the JPUS Plants and in the American Plants

	Last 12 Months		
	JPUS Plants	American Plants	Test Statistics (a)
Number of Initial Workers	17,135	7,196	--
Number of Plants	79	40	
Total Separation Rate	19.52%	28.17%	-14.17**
Quit Rate	9.29	17.86	-17.03**
Lay-off Rate	7.35	8.56	- 3.68**
Retirement Rate	0.55	1.20	- 4.57**
Termination Rate	2.32	0.56	12.22**
Total Accession Rate	17.10	24.40	-12.54**
New Hire Rate	13.87	17.27	- 7.63**
Recall Rate	3.23	7.13	-11.75**

	Last Months			
	JPUS Plants	American Plants	Test Statistics(a)	Average in the U.S. Manufacturing Firms (1971-81)
Total Separation Rate	1.66%	3.53%	-7.84**	4.13%
Quit Rate	0.79	2.33	-8.09**	1.92
Lay-off Rate	0.70	0.88	-1.36	1.35
Retirement Rate	0.11	0.23	-1.86*	0.86
Termination Rate	0.05	0.10	-1.13	
Total Accession Rate	2.19	2.96	-3.33**	3.98
New Hire Rate	1.58	2.23	-3.25**	2.77
Recall Rate	0.61	0.73	-1.02	0.90

Note: The average rates in the U.S. manufacturing firms are calculated basing on Employment and Earnings. These statistics are not available in the recent years.
The test statistics are the statistics to test the hypothesis that the each rate in the JPUS plants equals the counterpart of the American plants and are calculated as follows:

$$a = (P_J - P_U)/\sqrt{P_J - (1 - P_J)/N_J + P_U (1 - P_U)/ N_U}$$

where P_J = the separation rate in the JPUS plants, P_U = the separation rate in the American plants, N_J = the sample size in the JPUS plants, and N_U = the sample size in the American plants.

** - Significant at the 5 percent level.
* - Significant at the 10 percent level.

Table 9

Separation Rates, Quit Rates, Lay-off Rates, and Accession Rates of American Workers in the JPUS Plants and in the American Plants by Plant Size

SMALL PLANTS (less than 100 workers)

Last 12 months

	JPUS Plants	American Plants	Test Statistics
Number of Initial Workers	1826	847	-
Number of Plants	46	21	-
Total Separation Rate	20.76%	24.68%	-2.23**
Quit Rate	14.84	14.76	0.05
Lay-off Rate	5.15	6.97	-1.79*
Retirement Rate	0.55	2.83	-3.83**
Terminal Rate	0.22	0.12	0.62
Total Accession Rate	35.32	26.33	4.78**
New Hire Rate	33.52	19.24	8.17**
Recall Rate	1.81	7.08	-5.64**

Last Month

Total Separation Rate	2.03%	4.61%	-3.26**
Quit Rate	1.73	2.88	-1.77*
Lay-off Rate	0.15	1.50	-3.16**
Retirement Rate	0.10	0.23	-0.72
Terminal Rate	0.05	0.00	0.96
Total Accession Rate	5.54	3.92	1.89*
New Hire Rate	5.54	3.00	3.02**
Recall Rate	0.00	0.92	-2.80**

Table 9 (continued)

Separation Rates, Quit Rates, Lay-off Rates, and Accession Rates of American Workers in the JPUS Plants and in t he American Plants by Plant Size

LARGE PLANTS (more than 1000 workers)

Last 12 months

	JPUS Plants	American Plants	Test Statistics
Number of Initial Workers	7331	2830	-
Number of Plants	4	2	-
Total Separation Rate	17.51%	23.85%	- 6.92**
Quit Rate	1.91	13.04	-17.05**
Lay-off Rate	9.93	9.12	- 0.13
Retirement Rate	0.63	0.78	- 0.79
Termination Rate	5.05	0.92	13.22**
Total Accession Rate	10.87	14.49	- 4.79**
New Hire Rate	4.73	7.07	- 4.32**
Recall Rate	6.14	7.42	- 2.26**

Last Month

Total Separation Rate	0.82%	3.20%	- 6.85**
Quit Rate	0.17	1.93	- 6.69**
Lay-off Rate	0.44	0.81	- 2.00**
Retirement Rate	0.19	0.35	- 1.31
Terminal Rate	0.03	0.12	- 1.32
Total Accession Rate	1.20	2.24	- 3.40**
New Hire Rate	0.19	1.54	- 5.70**
Recall Rate	1.01	0.69	1.64

Table 9 (continued)

Separation Rates, Quit Rates, Lay-off Rates, and
Accession Rates of American Workers in the
JPUS Plants and in the American Plants by Plant Size

MEDIUM PLANTS (100-999 workers)

Last 12 Months

	JPUS Plants	American Plants	Test Statistics
Number of Initial Workers	7978	3519	-
Number of Plants	29	17	-
Total Separation Rates	21.07%	32.48%	-12.51**
Quit Rate	14.80	22.48	-14.12**
Lay-off Rate	5.48	8.50	- 5.65**
Retirement Rate	0.49	1.14	- 3.48**
Termination Rate	0.30	0.37	- 0.59
Total Accession Rate	18.65	31.91	-14.76**
New Hire Rate	17.77	25.01	- 8.56**
Recall Rate	0.88	6.91	-13.70**

Last Month

Total Separation Rate	2.29%	3.51%	- 3.46**
Quit Rate	1.09	2.48	- 4.85**
Lay-off Rate	1.08	0.77	1.64
Retirement Rate	0.05	0.14	- 0.49
Terminal Rate	0.08	0.11	- 0.47
Total Accession Rate	2.19	3.25	- 3.11**
New Hire Rate	1.77	2.54	- 3.49**
Recall Rate	0.42	0.71	- 1.82*